DOCUMENT RESUME

ED 133 944 EC 092 851

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TITLE Planning Programs for Children with Exceptional Educational Needs: Multi-Variate Analysis in the Evaluation of Special Education.
PUB DATE [76]
NOTE 16p.; Author: Liaison Education Affairs Comprehensive Child Care Center, Marshfield Clinic and Medical Foundation, Marshfield, Wisconsin

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS Conceptual Schemes; Early Childhood Education; Educational Programs; Elementary Secondary Education; *Handicapped Children; *Models; *Multiple Regression Analysis; Program Development; *Program Evaluation; *Program Planning; Special Education

ABSTRACT

Provided is the description of a program planning and assessment process model which is technically based on multi-variate analysis and can be used to evaluate special education programs. The model is noted to be divided into four sections: (1) specification of program objectives, (2) pre-assessment procedures, (3) evaluation methodology, and (4) post-assessment procedures. It is concluded that such a system would provide the necessary information required to appropriately plan and assess special education programs. (Author/IM)

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PLANNING PROGRAMS FOR CHILDREN WITH EXCEPTIONAL EDUCATIONAL NEEDS: MULTI-VARIATE ANALYSIS IN THE EVALUATION OF SPECIAL EDUCATION

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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EC092251

Abstract

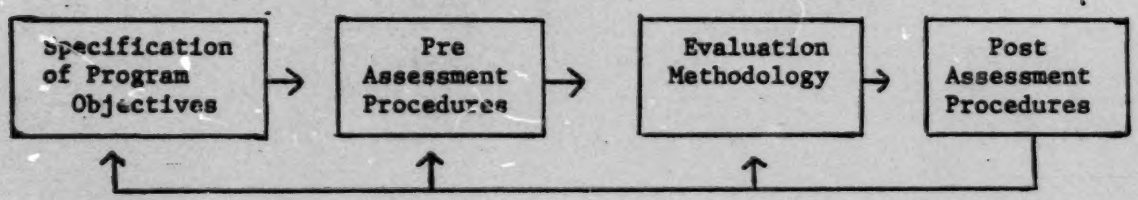
Traditional methods of program planning and assessment have failed to provide special education decision-makers with the necessary information to measure the impact of innovations in their operating systems. Similarily evaluation studies in special education have the common goal of producing evaluative statements concerning the worth of particular educational activities. Most of these studies are not pursued by means of well-established, orderly, and effective procedures and the techniques involved are often so primitive that they can hardly be described as techniques at all.

Currently the status of special education decision-making necessitates modern theory and methodology to provide for a program planning and assessment process which is systematically structured into a feasable operating system. Upon that basis, an attempt has been made to construct and illustrate the operations of a model which is technically based on multi-variate analysis. The model has been divided into four sections: (1) Specification of Program Objectives; (2) Pre Assessment Procedures; (3) Evaluation Methodology; and (4) Post Assessment Procedures. Such a system would provide the necessary information required to appropriately plan and assess special education programs.

Traditional methods of planning and evaluation have failed special educators in their attempts to assess the impact of innovations in operating systems (Guba, 1969). Evaluation studies in special education have the common goal of producing evaluative statements concerning the worth of particular educational activities. Most of these studies are not pursued by means of well-established, orderly and effective procedures, and indeed, the techniques involved are often so primitive that they can hardly be described as techniques at all (Coleman, 1966). Guba summarizes the current status of evaluation in special education on the note that what is needed is a technology of evaluation. Upon that basis an attempt will be made to devise and demonstrate the usefulness of a multi-variate planning and evaluation model. The development of the model will be around a core of elements necessary in any evaluation design.

The model will be used to assist special educators in the program planning and evaluation process.

A composite model of planning and evaluation will be designed within the following general structure:



The mechanical procedures involved in program planning and evaluation have been widely disseminated since they were first outlined by Ralph Tyler in a series of papers published over thirty years ago (1934). Central to such a program development process is the specification of objectives in terms of so-called specific behaviors and the means of obtaining evidence of the extent to which particular objectives are achieved by a program utilizing a specified population of students (mentally retarded, learning disabled, emotionally disturbed, etc.). Since his early delineation of the mechanical aspects of a systematic program development process, Tyler (1966) has specified the goals of educational evaluation as follows:

> . . . to appraise the achievement of individual students;
>
> . . . to provide information helpful in planning subsequent teaching;
>
> . . . to appraise the educational effectiveness of a curriculum, instructional materials, and procedures of administrative organizational arrangements; and
>
> . . . to assess the educational progress of larger populations in order to provide the public with dependable information to help in the understanding of educational problems.

Central to the theme of this presentation is the development of a multivariate approach to systematic special education program planning and assessment. The point of view taken by this author is that evaluation and assessment are to be viewed as interchangable. And to briefly describe the context of systematic program planning and development, it is important to acknowledge that in the practical sense of operations, evaluation is a matter of technique. An event occurs and the evaluator makes some record of the event. Careful study of the record generates factual statements serviceable as evidence for inferences leading to

generalizations, explanations, interpretations, predictions, and decisions. In the theoretical sense of reasoning, evaluation is a matter of using concepts, conceptual systems, constructs, models and theories. An event can be studied effectively if the evaluator generates a telling question. Such questions require key concepts or generative ideas which lead and guide techniques (Kaplan, 1964). Thus, evaluation can be thought of as bringing together conceptual systems at the theoretical level, and techniques at the operations level.

If one looks to the literature in the behavioral sciences (i.e., special education, psychology, sociology, education, economics, etc.), it is apparent that many factors can account for 'the theoretical relationships underlying the practical acts of doing' observed as daily happenings in the universe of events. To ask or answer questions involving complex relationships and numerous factors necessitates a device that allows the behavioral science investigator to ask a multi-dimensional question. If, as is often done, one focuses upon a specific relationship, it is apparent that many of the variables which are theoretically relevant to the investigator are randomized while only one or two factors are examined. While it seems that we recognize complexities regarding assessed human behavior we often fail to conduct studies which reflect these complexities (Kelly, 1969).

It is the position of this author that many special educators limit their assessment capabilities because the evaluation methods to which they have been exposed are limiting (Jones and Sommers, 1975 and 1976). A multi-variate procedure such as multiple regression analysis has been stimulated by the invention and wide spread use of the high speed computer. Subsequently, special educators may now ask multi-dimensional questions that have long

perplexed and hindered investigations and have contributed to the artificial 'theory versus practice' polemic (Everitt, 1975).

Rather than restricting the original evaluation question(s), the multivariate based model presented in this paper is designed to permit extending the number and types of questions that can be asked in an evaluation study through the application of multiple linear regression analysis. The planning and evaluation model is divided into four sections: (1) Specification of Program Objectives; (2) Pre Assessment Procedures; (3) Evaluation Methodology; and (4) Post Assessment Procedures. A description of the intergal aspects of each model section follows:

I. Specification of Program Objectives

The most important step in planning any special education program is the accurate specification of the objectives. Before implementing the assessment of a special education program, it is essential to establish the extent of the need for such a program. Often this is a multi-phase process where initial surveys are made to determine what goals and objectives have been purported for the program and whether any problems exist. Since it is usually impractical to administer surveys to derive such information from an entire population of exceptional children, sampling techniques and inferential statistics are generally applied. If the pilot survey suggests that a problem exists, decision-makers must establish priorities for exploring the concomitants of the problem. It is at this point that relatively sophisticated inferential models are essential.

The objectives are first identified on the basis of a projection of the desired program outcomes. Such goals and objectives are defined through staff development and inservice education activities. To reduce the risk of a

pre-mature evaluation, it becomes necessary to collect baseline data from either or both of the following sources:

(1) Previous program information and/or:

(2) Longitudinal data gathered over a specified period of time on those objectives initially defined as relevant evaluative concerns.

Quantifiable data is the only requirement that multiple linear regression analysis needs before inference is possible and many approaches to inferring the above are available. For example, one method may be to obtain the data in a post-hoc fashion by charting progress on one's defined objectives from an initial special education program (probably some years ago if the evaluation is of the longitudinal variety) to the most recent program. Depending upon your criterion (program accomplishments), the data gathered may be placed in a regression model allowing one to check for significant differences on various measures from one program year to another. This technique could be used as a measure of program, objective(s), and/or treatment success. Extending this technique, it would be possible to determine the most parsimonious set of reasons responsible for the successes and failures of the designated program. Technical operations would include the measurement of interaction and possible curvilinear effects with thoughts of finding a systematic solution in the determination of program accomplishments.

Another method would be the longitudinal analysis of the program variables. Independent and dependent variable fluctuations may be measured through the application of the multiple regression model. Once obtained, baseline data profiles are charted, plotting independent and dependent variable relationships on 'a measurement of change' basis over time. The longitudinal method is more highly recommended if economic and time factors are not of great importance, since

the initial definition and specification of the program objectives which would be known upon the first collection of data, would require systematic monitorization to remain relatively constant throughout an extended period of time. In retrospect, the post-hoc analysis leaves the evaluator speculating as to just exactly 'how the present program objectives differ in context from the initial objectives.' Also, the question arises concerning whether or not the same evaluator was present at the inception of the special education program (of a continuing series), and secondly, has his definition and subsequent data collection procedures remained constant?

Success or failure in achieving the specified program objectives can be determined through a time-series analysis which compares each program objective from time 1 to time 2....to the next time. Multi-variate analysis will assist in the diagnosis of possible resulting problems that would have prevented program needs from being met and opportunities from being used. This program development procedure provides an essential basis for developing evaluation objectives whose accomplishment will result in program improvement.

II. Pre Assessment Procedures

Prior to the implementation of a special program (or shortly after such a program has begun) a selected or randomly sampled segment of the group receiving the program is assessed to determine their present level of functioning on the objectives. Initial steps taken during the preassessment phase include: (1) a review of proposed strategies by selected panels of special education specialists, (2) a review of on-going programs in other geographic areas that may have relevance for meeting similar objectives, and; (3) the planning of specific procedures and time schedules to implement the strategies.

When a number of strategies are under consideration, a multi-variate analysis can be used to assess the relative benefits of each. This information, in conjunction with the data collected during the specification of objectives phase, is used by the decision-makers in selecting appropriate alternatives for given situations.

Information is then collected on statistically inferred independent and dependent relationships among the special education program variables. These data can then be used to answer questions of the following variety:

(1) How much of what is to be learned and demonstrated in the program is already known by the sample (population under study)?

(2) Does the sample have the prerequisite behavioral and physical capacity for the program they are receiving?

The results of preassessment will provide information regarding:

. . . . . if and to what extent pre-program differences exist among group and individual characteristics of the population who will be receiving the program.

At the point where alternative strategies are implemented, a procedure for monitoring them is used to insure that they conform to the program design. By systematically comparing programs on a longitudinal basis, the effect of specific program alternatives for a given system can be well decumented. This type of information is absolutely essential to make valid decisions regarding the maintenance, modification, or discontinuation of an ongoing program. The preassessment phase provides the program decision-makers with information about the present state of affairs surrounding the stability of objectives and the children receiving such program services.

III. Evaluation Methodology

Multiple linear regression analysis can adequately reflect the complexities of the newer evaluation theories, consequently it was selected as the basic statistical methodology for the multi-variate based model. From research we know a multi-facet question requires a multi-facet methodological approach before an appropriate solution can be found. For example, Sommers, Joiner and others (1970) speak of the multi-dimensionality of research concerns when behavioral entities are involved:

> "It is assumed that performance or behavior is subject to the influence of more than one variable or condition at a time and that adequate explanations involve more than a single variable or condition. But, if several variables are proposed as being relevant to performance it becomes necessary to measure both the influence of the variables on the behavior we are attempting to explain and their influence on each other."

The multi-variate procedure allows practitioners the freedom to apply a theoretical multi-behavior model to the real world of special education problem solving and garner generalizable alternatives. It is accepted that people act in similar ways, but often for different reasons. In recent years we have recognized the problems inherent in assuming that a specific behavior has the same origin in all cases. It is within this framework that individualized approaches to education for children with problems in learning have developed. In this situation, a large number of devices may become important in aiding in the development of an educational program for individual students. In addition to determining the level at which the student is functioning, it may be important to identify particular areas of weakness or of strength which can be taken in account when planning.

As we develop more sophistication regarding the nature of the learning process of students in educational programs, the need for more precise assessment techniques and the corresponding remedial treatments become imperative. Multi-variate analysis provides for a system to delineate the most efficient assessment techniques and the most effective program alternatives to hasten acceptance of the special education philosophy of styling programs after student characteristics and not vice versa.

Multiple regression analysis, being an adaptable form of multi-variate analysis provides the investigative ability to statistical predication to assess operating systems in education. The power of prediction as an intellectual tool resides in the fact that it enables one to rigorously test the adequacy of various theoretical evaluation models that might be proposed. In this procedure, it is assumed that if certain variables predict events that are of interest to one in a fairly accurate way, they are more relevant to the behavior or program objective(s) than those which do not. In terms of evaluation settings, variables which are highly predictive of attainment levels should be taken into account in programming to a greater extent than those variables which are not.

IV. Post Assessment Procedures

Following the selection and preassessment of the program objectives, followed by the instructional process, implementation of the post assessment procedures are used to determine to what extent the objectives have been reached. After the program has been in operation for a pre-determined length of time, the children who are receiving the program are assessed to determine whether differences exist between data collected in the preassessment phase as compared to data collected in the postassessment phase.

Another consideration evidenced at this time is the provision of total program information to persons responsible for implementing plans and procedures. After the results have been collected, an operational information system would exhibit the following functions:

(1) . . . to detect or predict defects in the procedural design or it's implementation during implementation stages;

(2) . . . to provide information for programming decisions; and

(3) . . . to maintain a record of the procedure as it occurs.

The purpose of the information system is to assure the provision that data is available for measurement and interpretation of attainments not only at the end of a program's cycle, but as often as deemed necessary during each phase of the program. General considerations effecting the operation of a continually refining information system include the following:

(1) . . . devising quantitative special education program objectives;

(2) . . . measuring criteria associated with the objectives of the activity;

(3) . . . comparing criteria success with predetermined absolute or relative standards; and

(4) . . . generalizing interpretable results of the outcomes using recorded specification, pre-assessment, and post-assessment information.

This type of an information system would provide for the selection of one or a combination of the following alternatives in the change process:

(1) . . . deciding to continue;

(2) . . . terminate;

(3) . . . modify or re-focus an activity.

Multi-variate analysis is applicable to any planning and evaluation setting in which it is possible to quantify your data. Webster and Eichelberger (1970) have attempted to explain the utilization of multiple regression analysis, as generalized by Bottenberg and Ward (1960),

Prodley (1968), Jennings (1967), and Kelly, Beggs, McNeil, Eichelberger, and Lyon (1969) within the context of the Stuffelbeam (CIPP) evaluation model. The emphasis of their application was to promote the use of inferential statistics for the evaluation of educational programs in the public school environment.

Much concern has been voiced about the failure of evaluation in special education. The efforts of Webster and Eichelberger appear to be the first in an attempt to become more precise with reference to the evaluation paradigm. The utilization of multi-variate analysis may be part of the solution to the failure of evaluation. Guba (1969), supporting what has been a general consensus of opinion by educational evaluators, examines the evaluation paradigm by focusing on certain lacks and submits the questions:

> ". . . why cannot evaluation programs be designed and implemented that will quickly eradicate the following crucial lacks?
>
> 1) lack of adequate definition of evaluation
> 2) lack of evaluation theory
> 3) the inapplicability of assumptions
> 4) the impossibility of continuous refinement
> 5) lack of knowledge about decision processes
> 6) lack of criteria"

Guba concludes by stating:

"The primary task in evaluation today is the provision of sensible alternatives to the evaluator. The evaluation of educational innovations awaits modernization of the theory and practice of the evaluation art. We need then, a technology of evaluation."

The crucial lacks of present planning and evaluation efforts present a challenge to evaluation designers. Multi-variate procedures appear to be an effective approach to assess the quantitative relationships between variables relevant to each of the categorical lacks designated by Guba.

SUMMARY

Evaluation studies in special education have the common goal of producing planning and evaluative statements concerning the worth of particular educational activities and the relative progress of special education programming. The current status of special education planning and evaluation necessitates modern theory and methodology, since traditionally structured programs have failed special educators in their attempts to reflect and assess relevant educational concerns. What is needed in special education, then is a technology of evaluation allowing standard methods to be generalized in every evaluation setting. Once the evaluation process is systematically structured into a feasible operating system, the ensuing evaluation will reflect and maximize the efficiency with which program objectives are achieved. Upon that basis, an attempt has been made to construct and exhibit the usefulness of a multi-variate planning and evaluation model.

The model which is technically based on multi-variate analysis is divided into four sections: (1) Specification of Program Objectives; (2) Pre Assessment Procedures: (3) Evaluation Methodology; and (4) Post Assessment Procedures. Such a system would provide the necessary information required to appropriately plan and evaluate special education programs.

REFERENCES

Bottenberg, R.A., and Ward, J.H., Jr. Applied multiple linear regression. U.S. Department of Commerce--Office of Technical Services, AD413128, 1963.

Cohen, J. Multiple regression as a general data analytic system. Psychological Bulletin, 1968, 70, 426-443.

Coleman, J.S. Equality of educational opportunity, National Center for Educational Statistics, U.S. Government Printing Office, Washington, D.C., 1966, p. 325.

Everitt, B.S. Multivariate Analysis: The Need for Data and Other Problems. British Journal of Psychiatry, 126:237-240, 1975.

Guba, E.G. The failure of educational evaluation, Educational Technology, May, 1969, 29-38.

Jennings, E. Fixed effects of analysis of variance by regression analysis, Multivariate Behavioral Research, 1967, 2, 98-108.

Jones, W.A. and Sommers, P.A. Comprehensive Needs Assessment: An Inferential Approach. The Journal of Educational Technology, Vol. XV, No. 4, 1975.

Jones, W.A. and Sommers, P.A. The Delicate Art of Teacher Evaluation. The Journal of Experimental Education, Vol. 44, No. 4, 1976.

Kaplan, A. The conduct of inquiry. San Francisco: Chandler, 1964.

Kelly, F.J., Beggs, D.L., McNeil, K.A., Eichelberger, R.T., and Lyon, J. Research design in the behavioral sciences: Multiple regression approach. Carbondale, Illinois: Southern Illinois University Press, 1969.

Phi Delta Kappa National Study Commission on Evaluation, Educational Evaluation and Decision-Making. Phi Delta Kappa International (in press), 1970.

Sommers, P.A., Joiner, L.M., and others. Kinesio-perceptual abilities as predictors of race: A study of the disadvantaged, The Negro Educational Review, October, 1970.

Tyler, R.W. Constructing achievement tests. Columbus: Ohio State University, 1934.

Tyler, R.W. The objective and plans for a national assessment of educational progress, Journal of Educational Measurement, 1966, 3(1), 1-4.

Webster, W.T. and Eichelberger, R.T. A use of the regression model in educational evaluation, An unpublished manuscript, 1970.